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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/821,753	03/30/2001	Tuqiang Ni	2328-053	5171

7590

03/11/2003

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EXAMINER

ALEJANDRO MULERO, LUZ L

ART UNIT

PAPER NUMBER

1763

DATE MAILED: 03/11/2003

6

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application N .

09/821,753

Applicant(s)

NI ET AL.

Examiner

Luz L. Alejandro

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-- Th MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 31 December 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-22 is/are pending in the application.
- 4a) Of the above claim(s) 14-16 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-13 and 17-28 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

## DETAILED ACTION

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1-13 and 17-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chen et al., U.S. Patent 5,807,789 in view of Tsuchiya et al., U.S. Patent 5,716,534 and further in view of Howald et al., WO 00/58992.

Chen et al. shows the process substantially as claimed including forming a trench through plasma etching where the RF power is changed and the flow rate and the species are not changed in order to form a trench with a tapered profile and rounded

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corners at an intersection of a wall and a base of a trench in response to the power change (see col. 2-line 64 to col. 4-line 30).

Chen et al. fails to expressly disclose: 1) where the change in RF power is substantially continuous and gradual, for example, the power change including steps having power changes no greater than about several watts, the power remaining at a constant wattage for no more than about one millisecond or for about one millisecond to one second, 2) wherein the gradual change is pre-programmed while no change occurs in the pressure, 3) wherein the AC power is supplied by an electrode coupling an AC electric field to plasma in the chamber, the electrode being responsive to an AC power source that supplies RF bias to the electrode that is on a holder for the workpiece, the AC power supplied by a coil coupling a RF plasma electromagnetic field to the chamber, 4) the vacuum chamber being subject to operating at different pressures while the workpiece is being processed, and 5) the gas species being subject to flowing into the chamber at different flow rates while the workpiece is being processed.

Tsuchiya et al. discloses a process whereby during an etching process the RF power is either changed in a step-wise manner or gradually changed in order to provide, for example, a hole or sidewall with tapered sides (see col. 12-line 6 to col. 13-line 37). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the process of Chen et al. as disclosed by Tsuchiya et al. so as to gradually change the power because Tsuchiya et al. discloses that gradual changes in the power can be performed for fine control of the process (see figs. 32-33 and col. 13-lines 16-27). With respect to the specific time period to which

the power remains at constant wattage and the amount the power is changed, it would have been obvious to determine through routine experimentation the optimum amount of time at which the power should remain constant and the optimum amount the power is changed, to achieve the desired rounded profile of the trench and would not lend patentability to the instant application absent the showing of unexpected results.

Furthermore, Howald et al. discloses a method of processing by etching (see page 1-lines 15-19) a workpiece in a vacuum plasma processor chamber including computers 20 and 34 and wherein a gas species is converted into an AC plasma (see page 6-lines 17-20), the vacuum chamber being subject to operating at different pressures while the workpiece is being processed, the gas species being subject to flowing into the chamber at different flow rates while the workpiece is being processed (see page 2, lines 15-22). Note also that the AC power is supplied by an electrode 56 being on a holder for the workpiece and the electrode is responsive to an AC power source that is supplied by a coil 48 coupling an RF plasma excitation field to the chamber. In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the process of Chen et al. modified by Tsuchiya et al. so as to include a process using the apparatus of Howald et al. because such an apparatus allows for a high level of control over the plasma process being performed. Moreover, with respect to the changes in power being pre-programmed, it would have been obvious to one of ordinary skill in the art at the time the invention was made to pre-program the power change into the microprocessors 20,34 of Howald et al. because in such a way operator error will be eliminated.

Moreover, merely using a computer to automate a known process does not by itself impart nonobviousness to the invention. See *Dann v. Johnston*, 425 U.S. 219, 227-30, 189 USPQ 257, 261 (1976); *In re Venner*, 262 F.2d 91, 95, 120 USPQ 193, 194 (CCPA 1958).

### ***Response to Arguments***

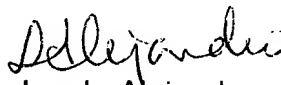
Applicant's arguments with respect to claims 1-13 and 17-28 have been considered but are moot in view of the new ground(s) of rejection.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Luz L. Alejandro whose telephone number is 703-305-4545. The examiner can normally be reached on Monday to Thursday from 7:30 to 6:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory L. Mills can be reached on 703-308-1633. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9310 for regular communications and 703-872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.

  
Luz L. Alejandro  
Patent Examiner  
Art Unit 1763

March 8, 2003